

## Analysis of Shooting a Free Throw

### Phase I: Shot Prep

The players' feet are parallel facing forward towards the basket. The feet are shoulder width apart, and the shooting foot is anterior and should be in line with the middle of the basket. The weight should be distributed equally on both feet, making the sagittal plane of the body equal. The shooting foot and shooting hand are in line in the same side of this plane. The non-shooting foot is slightly posterior than the shooting foot, and the tip of this foot should be aligned with the bottom of the shooting foot.



The player should extend their fingers for best control of the ball, and place their spread fingers so they are directly behind the ball. The wrist should be in extension in order to help support the ball and be in correct position to complete the shot. The non-shooting wrist should also be slightly extended, with both thumbs of the two hands forming a "T". The ball is resting on the pads of the fingertips, one of the most distal parts of the body.

The ball is held stationary at the waist level, while the shooting hand is extended behind the ball. The shoulder of the shooting arm is abducted, and close to zero degrees, or parallel to the body, while the other arm is held along the trunk. The shooting arm elbow points directly to the floor while the guide hand elbow is positioned to the anterior of the off foot. Both the shooting arm and the non-shooting arm positions produce an "L" formation.

The lower body is pointed towards the basket and the knees are flexed close to 90 degrees. The shoulders are square to the basket and the hips are also flexed facing the basket. The trunk is flexed forward from the vertical position. This trunk flexion is very critical, as the extension of the trunk helps load the legs, and the knee and hip extension, which leads to more power in the free throw.

The players head is up and facing forward. The eyes are focused on the front of the rim of the basketball hoop.

This crouched position with the knees flexed, hips flexed, ankles dorsiflexed, trunk flexed forward, feet shoulder width apart, and the ball held close to the trunk above the shooting knee, is needed going into the next phase of shooting a free throw. At this point the hip, knee, and

ankle of the shooting side should also be lined up vertically on the respective side of the sagittal plane.



### **Phase II: Shooting Position**

Player now enters into the force producing part of the shot. The ball is raised up towards shoulder level by using shoulder flexion, and the trunk also begins to extend. As the trunk is raised from the flexed position, back to the near vertical position, this extension causes the knees to increase in the depth of their flexion. This movement and acceleration of the trunk upwards to the vertical position also increases the depth of the dorsiflexion.



As the ball is raised through shoulder flexion, and the trunk is extending to vertical, the body wants to maintain the vertical position and not move into either part of the frontal plane or axes of the body. As the trunk is approaching full extension, the shoulder flexion enables the ball to be at shoulder level and moving towards the forehead of the shooter.

As the trunk extension is taking place towards vertical, and the knee flexion is increased, the shoulder flexion also increases and the ball starts being raised. The player keeps their sight on the rim over the ball while this is occurring. The fingers are well spread and the ball sits on the base of the fingers and the pads of the fingers, not directly on the palm.

When the trunk reaches vertical position and the ball is at shoulder level, the knees are in maximal flexion and the ball has zero vertical velocity. At this point the force the shot needs come from the extension of the knees and hips, and the elevation of the ball by shoulder flexion.

The knees and hips should be extended first, followed by shoulder flexion, then elbow extension, and finally wrist flexion.

While this is going on the shooting shoulder is in a flexed position and goes from parallel with the upper torso to parallel with the floor. As the upper arm is raised horizontally the elbow flexion is greatly increased. The shooting arm elbow now points toward the rim of the basket. The shooting arm forearm is perpendicular to the floor and straight in relationship to the basket. The shooting wrist should be in extreme hyperextension as the ball is elevated through the shoulder flexion. This hyperextension will maximize the range of flexion that can occur during the shot.

Both the shooting arm and off arm continue to stay in positions that produce “L” formations, and the ball stays in a position where the shooting hand is in a vertical line with the shooting elbow, and shooting foot. The non-shooting hand should be placed on the side of the ball a little behind the center, so the shooter can rotate the shoulder forward to line up with the basket. This allows the forward rotation of the trunk in the transverse plane, so that the shooting arm is in front, and the non-shooting side that has been rotated backwards is posterior to the shooting arm.

### Phase III: Shooting Release

The ball is released during a forceful wrist flexion, coming out of the hyper extended position. The ball moves off the fingertips and leaves the tip of the index finger last, one of the most distal parts of the body. The forward flexion or flick of the wrist will create backspin on the ball. As this flexion of the wrist occurs pronation of the forearm is also occurring, which will again help the ball to have backspin. If supination of the lower arm occurs while releasing the ball this could create an unwanted sidespin on the ball.



At the release the trunk and legs should be fully extended, as well as full plantar flexion. Whether a player jumps or not, the trunk needs to remain vertical through the release. The elbow should also be approaching full extension at the release while the wrist remains in a position halfway between full flexion and full extension. The final wrist flexion provides the

final thrust for the release of the ball.

The non-shooting hand should drop off of the ball just prior to the release. As the wrist is flexing for release the non-shooting hand should drop to the side of the ball, with the palm facing the ball. The non-shooting hand should remain in this position during the release of the ball so that it does not make any unwanted sidespin from lower arm supination, or pronation during the release.

When the knees and hips are fully extended, ankles plantar flexed, the trunk is extended and straight, and the shoulder is flexed and elbow extended, the player is ready to release the ball. There is full extension of the shooting arm at release, and the ball is lined up with the shoulder, hip and knee of the shooting side. The ball rolls off the fingertips during the release as the elbow continues to extend and the wrist begins flexion.

#### **Phase IV: Follow Through**

This is the final phase of the free throw in which all joints continue to move through to the end of their full range of motion after the release of the ball. At the point of the follow through of the shot the knees are fully extended and the ankles plantarflexed. The trunk is vertical and the shooting hip is lined up vertically with the knee and ankle, as well as the shoulder and elbow joint.

The shoulder is in flexion and also in a vertical position. Once the ball has left the hand the elbow should be in full extension, and the wrist should be fully flexed. The forearm should be in pronation as the fingers are pointing slightly to the outside. Maintaining this follow through position until the ball hits the rim helps keep a frontal focus of the eyes and head of the player on the rim while shooting.



